Docket #: S20-362

Silicon-Carbide-on-Insulator via photoelectrochemical etching

Stanford researchers have improved upon a prior technology, S18-553 Silicon-Carbide-on-Insulator (SiCOI) Fabrication , to produce high quality, wafer-scale SiCOI. Current methods of producing SiCOI are unable to achieve the necessary uniformity at scale. Researchers in the Vuckovic group have developed a photochemical etching technique to overcome these issues. A less doped device layer is grown on a heavily doped sacrificial silicon carbide (SiC) layer before bonding to a handle wafer. The sacrificial layer is then mechanically ground down resulting in a small amount of grinding non-uniformity. A photochemical etch followed by chemical mechanical polishing results in high quality, wafer-scale SiCOI suitable for quantum and nonlinear photonic applications.

Stage of Research

- Proof of concept

Applications

- Quantum electronics and photonics
- Nonlinear photonics
- High Q devices
- Sensors

Advantages

- Wafer scale high quality silicon carbide on insulator
- 10-fold reduction in waveguide losses compared to conventional techniques

Publications

- D.M. Lukin, C. Dory, M.A. Guidry, K.Y. Yang, S.D. Mishra, R. Trivedi, M. Radulaski, S. Sun, D. Vercruysse, G. H. Ahn, J. Vuckovic 4H-silicon-carbiode-on-insulator for integrated quantum and nonlinear photonics *Nature Photonics*, December 2, 2019.

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